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VIEWS, NEWS AND INTERVIEWS.

According to a traveler an intense prejudice exists against the introduction of electricity into Turkey. The only application of electricity in evidence in that country is the telegraph. Large sums have been offered the government for electric lighting and telephone privileges, but all have been refused.

A Brooklyn man has sued a street railway company in that city for $60,000 damages. His six year old daughter was playing in the street, was run over by a car and had her left leg cut off.

Mr. Allan, a resident of Melbourne, Australia, has invented an electric submarine torpedo boat which, he claims, can be sunk to any depth and can be run as fast as a surface boat. It can be kept submerged, he says, for three days. A successful experiment with Allan's model was made two weeks ago in the presence of the Earl of Hopetoun and many naval and military officers. After seeing the experiments Rear Admiral Bowden-Smith gave the opinion that the boat was all that Mr. Allan claimed, and was destined to revolutionize naval warfare.

Mr. John I. Beggs, of the Cincinnati Edison company, has what is said to be the most complete and conveniently arranged roll top office desk in the electrical business.

The café of the Grand Hotel at Broadway and Thirty-first street, New York, is becoming a popular meeting place for electrical men. Now that "Ferdinand's" is a place of the past, the natural tendency among the boys is of an up-town character. Another meeting place, known to but a select few, is called the Wurzburger Club, and is located in the vicinity of the Grand Central depot. It is claimed that the club is named after an electrician, but he must be a foreigner, as his name doesn't appear in any American biographical dictionary. The objects of the club are said to be the cultivation of the Delsartean system and the discussion of obscure passages in the "Rubaiyat" of Omar Khayyam.

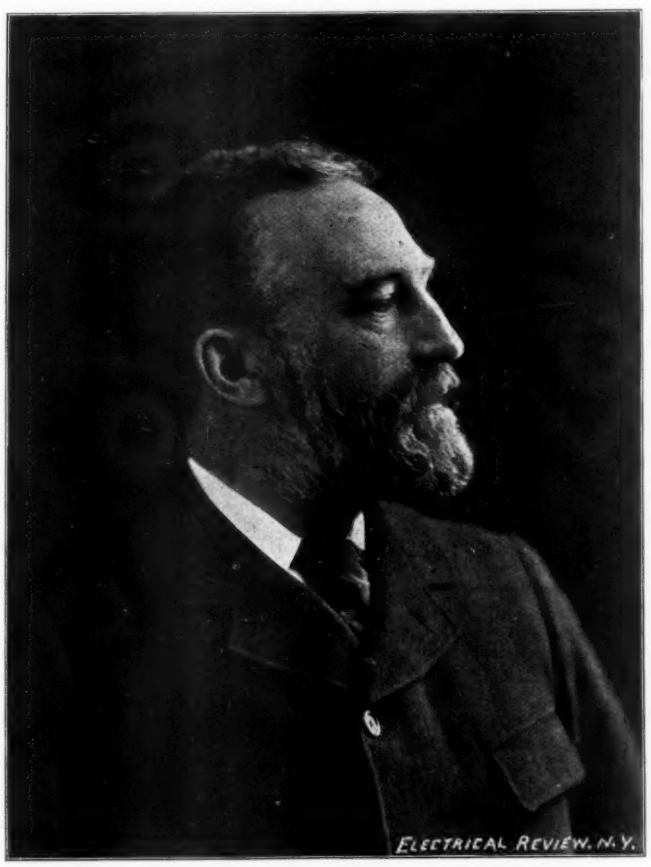
In a Harlem grocery store there is usually on exhibition a pyramid of vegetables and fruit set in the center of the floor and visible from the street. Scattered through the pyramid are incandescent lights of various colors and arranged to flash in different combinations at intervals.

A committee of Philadelphia councilmen last week witnessed trials of 15 fenders for trolley cars. The dummies were of various sizes and styles, varying from a tiny one named Little Willie Green up to Little Willie's Papa and Mamma, all of the family being made up of wadding or sawdust, sewed in stout canvas.

GRANVILLE C. CUNNINGHAM.

MEMBER EXECUTIVE COMMITTEE AMERICAN STREET RAILWAY ASSOCIATION.

Mr. Granville C. Cunningham, of Montreal, P. Q., who was elected a member of the Executive Committee of the American Street Railway Association at the recent Atlanta convention, learned the profession of civil engineering in Edinburgh, Scotland. After having been engaged in various railway works and other engineering enterprises in the old country, he left his native land in 1870 and went to Honduras in Central America, where he had charge of part of the surveys of a trans-continental railway that was then projected. The outbreak of war between Honduras and San Salvador brought this enterprise to an untimely end, and in 1871 Mr. Cunningham came to Canada. Since then his work has connected him with many of the chief railway schemes of that country. Subsequently he turned his attention to railway law, with the purpose of giving up the engineering profession, and for two years lived at St. Thomas, Ont., as the resident solicitor of the Canada Southern Railway. In 1882, however, he was appointed chief engineer of that line, which position he held until its amalgamation with the Michigan Central. He then took up contracting and built the double track branch of the Michigan Central, from Welland to Niagara Falls, in connection with the great cantilever bridge across the Niagara gorge, which work was finished in the end of 1883. In 1884 and 1885 two years were spent on the Rocky Mountain division of the C. P. R. as assistant to the manager of construction, concluding with a Winter spent at the summit of the Selkirks for the purpose of observing the snow slides and designing snow sheds—an occupation of no small danger. After this he was again a contractor, and in 1887 and 1889 carried out contracts for the construction for part of the Temiscouata line near Riviere du Loup, and of the C. P. R. short line near Sherbrooke. In 1889 Mr. Cunningham was appointed assistant city engineer and afterwards city engineer of Toronto. Here his attention was directed to electric street railway matters, and it was on the report made by him to the City Council of Toronto that the system now in operation there was adopted. In 1892 he was appointed chief engineer of the Montreal street railway, and the work of converting this from a horse to an electric system has been carried out under his direction. In 1893 he was appointed manager and chief engineer of the Montreal street railway. In 1874 Mr. Cunningham was elected a member of the Institution of Civil Engineers of London, and has contributed papers



MR. GRANVILLE C. CUNNINGHAM, OF MONTREAL, CANADA, MEMBER OF THE EXECUTIVE COMMITTEE, AMERICAN STREET RAILWAY ASSOCIATION.

to the transactions of that society, notably one describing the construction work on the C. P. R. in the Rocky Mountains, which was separately published by the society, with cognate papers in pamphlet form. He was also among the first members of the Canadian Society of Civil Engineers and was recently elected a fellow of the Royal Colonial Society of England.

ELECTRIC LIGHT FLASHES.

Geneseo, N. Y., is very proud of its new electric street lights. There are 40 of them.

The Central Electric Light Company, of Portage la Prairie, Man., will install a new dynamo.

Millis, Mass., voted almost unanimously for a municipal lighting plant. The present plant will be purchased by the town.

City Engineer Hough estimates that a 200 light plant operated by water power will cost the city of Spokane, Wash., $37,504.25 to install.

Newton, Mass., wants to go into the electric lighting business and has asked permission to buy the electric plant of the Newton and Watertown Gas and Electric Lighting Company.

The original stockholders of the Brockport, N. Y., Electric Light Company will receive from $12 to $15 on each $100 invested by them. The plant was recently sold on a mortgage foreclosure.

The officers of the Homestead Electric Light and Power Company have decided to give Homestead, Pa., better service. New machinery has been ordered and 45 new arc lights will be placed in position.

The People's Electric Light and Power Company has offered to furnish to the city of Oswego, N. Y., 109 arc lights at $84 each and 230 incandescents at $4.80 each per annum on a five years' contract.

The Central Railroad and Electric Company, of New Britain, Conn., has bought the franchise of the Plainville Light Company and will supply that town with arc and incandescent lamps. The company will put in a new dynamo to generate the extra power needed.

A petition is being circulated for the reorganization of the Westinghouse Electric Light, Heat and Power Company, of York, Pa. The reorganization is to be on a capital basis of $30,000. It is said this will let in the original stockholders for 30 per cent of their original investment.

The Hudson Electric Light Company wants the town of Hudson, Mass., which, it says, has voted to establish an electric light plant of its own, ordered to purchase its plant at a price to be determined by commissioners to be appointed by the Supreme Court under chapter 370 of the laws of 1891. For this purpose it has brought a petition under this statute.

A STANDARD FORM OF STREET RAILWAY ACCOUNTS.

ABSTRACT OF A COMMITTEE REPORT TO THE AMERICAN STREET RAILWAY ASSOCIATION, ATLANTA, GA., OCTOBER 18, 1894, SUBMITTED BY H. I. BETTIS.

On September 7 the committee sent to all the members of the Association a classification of expenditures which could be readily adopted for use upon any road, and so arranged that any or all of these accounts can be subdivided to any degree desired by the road adopting them without impairing its value as a basis for comparative statements. Accompanying this was a circular letter requesting the accounting officers of the several roads to carefully examine this classification, noting such items as in their opinion are erroneously classified, and also requesting that sample reports, blanks and special rulings for account books be sent the committee for inspection. The replies received were in the main very full and complete and showed an interest in the subject, but the number, compared with the number of members in the association, was very small, and in consequence there was a postal sent out about two weeks later, but with little effect upon the delinquents. The results obtained from the replies received will be taken up later.

Special ruled account books and ruled forms of reports of various kinds are a means to accomplish results. If we are seeking the uniform results, uniform methods may be employed, and will naturally be employed, those which are the simplest in form and manner of filling out being preferable. For this reason the committee urges you to take some steps toward adopting a standard classification, that the end to be accomplished by all will be uniform, and this done the standardizing of forms and methods of street railway accounting will follow.

At the time the subject was assigned, and until the returns came in from the circular letters, the committee was not aware that a classification of accounts had been presented to the association at one of its earlier meetings in 1884, and long before this committee had even a speaking acquaintance with the street railway business. Had the committee been aware of the fact, it might have understood that its particular function was to prepare a set of blanks to conform with the classification presented in 1884. It is, perhaps, just as well, for with the progress in street railway affairs in the past 10 years the classification presented then for roads operated entirely by animal power is nearly out of date, and it would be better to frame one which can be adapted to all classes and kinds of roads, with any or all kinds of motive power, which we believe you will find to be the case of that presented with this report.

In adopting a standard classification as a basis for reports from all roads, we must decide upon the minimum number of accounts into which it can be divided, and yet give all the information that the majority would desire. Each of these accounts must be carefully analyzed and so closely defined that each particular account shall have at all times the same constituent elements on every road. This much decided, any company wishing any more detail may divide and subdivide until there are twice or thrice the number of accounts, but still retaining the distinctive features of each particular group.

With companies formed under the laws of Great Britain, this is provided for by the "Companies Act" by which all railroad corporations are obliged to keep their accounts according to the forms and methods prescribed by the government, and the books are regularly passed upon by a board of examiners, besides annual or semi-annual audits of the assets, liabilities accounts and vouchers by independent auditors or chartered accountants. By this system of government supervision and inspection the methods and reports are necessarily uniform and afford a means for comparative statements and statistical information, unexcelled by any in the world in precision and accuracy. In the United States the Interstate Commission and the railroad commissioners of many States have to a certain degree exercised their power in the same direction, demanding yearly reports for publication. In the case of street railways this information is only taken for purely statistical purposes, and so far as the street railway interests are concerned it could be very well dispensed with.

An English writer upon this subject says:

"Uniformity in railway accounting in every respect is greatly to be desired. Much has already been done in this direction and the periodical reports of our English, Indian, colonial and foreign railways under English control are models of completeness. There is, however, room for improvement. If the able administrators of American railroads could see their way to adopt a more uniform method of compiling their published accounts, setting forth the particulars of capital authorized, raised and expended, revenue earnings and disbursements, assets and liabilities on defined principles, and in a manner intelligible to any ordinary man of business, it would tend greatly to improve the value of sound railway securities."

This is recognized by every thinking man amongst us, especially those who have to do with the securities of our roads; and yet in the construction, equipment and operation of our tramways, we are far in advance of any country in the world, and English capitalists have not been slow to perceive this and demonstrate their faith in our work by investing in our street railway properties. Before doing so they prefer to have the accounts examined by an independent auditor, as is the custom among themselves, nor can we blame them for this business-like proceeding—it has been instilled into them. Were there a more uniform system of reports and accounting, there is no doubt but that the stock and bonds of our wonderful street railway properties would find an open market abroad.

The classification presented in 1884 was too elaborate for a small company, many directors and managers not caring for information in such minute detail, even on many of our largest and best equipped roads, there being 70 divisions of the operating expenses, while that submitted to you now has but 30, and even this might be simplified.

The interests of this committee are, first, last and all the time, with the owners of the property, the stockholders and their directors, and by conjunction with the bankers, who secure a market for their loans, and with the bond purchasers. These are the parties whose money and energy have built up our magnificent structures, and they should receive such information concerning the operation, earnings and expenditures as will enable them to know the value of their investment. The managers and superintendents occasionally look at these monthly reports and are pleased to carry them before the directors in person, if the totals make a good showing, otherwise they are apt to be mailed. Results are what they all want, and it matters but little to them whether the report is divided into 100 distinctive classes of receipts and expenditures or 10. The road has earned a certain amount, and a certain percentage of that is irrevocably gone, and the subdivision of accounts could not have saved it. This might seem to be an argument in favor of the abolition of everything but the profit and loss account, but we do not go so far as that; we would advocate that the reports be much simplified, and that the standard be simple and concise enough for the smallest road and the most conservative ideas.

The stockholders and directors, having invested their precious dollars with others in an enterprise which has given every promise of noble returns in due time, are anxious to know the results from their venture, and from time to time wish for a report which can be compared with those of other companies in the same or similar fields.

The banker, who has your bonds to put upon the market, asks for a statement of your earnings and expenses from the time the road was started. There is, perhaps, another road similarly situated, and with a certain amount of capital, which, to his knowledge, has issued bonds to a certain amount, and this road is not only paying the interest on those bonds, but a certain dividend upon its stock. By a comparison of the reports of the two roads, he makes his calculations, which are submitted to the dear public, and purchasers for the bonds are readily found. The creditors, too, and their name is legion, the supply men, manufacturers of cars, electrical, cable and other machinery, are all interested in your financial reports; the lawyers, judges and receivers sometimes knock at the door for a copy of this valuable document. How necessary, then, that it should be all that is required of it.

Who of all this list cares to go into the minute detail of a lengthy report? Very few, if any. These are the persons who take the greatest interest in our affairs, and they seldom have the time or the inclination to wade through the petty and cumbrous detail. Who is it, then, that has served us this "kettle of fish"? None of the parties mentioned could have laid it at their door; they don't want it. We hold the divining rod in our hand, and it points to the auditor and the accounting officer, the secretary and treasurer, the figure fiend, the statistician, assisted by those managers and superintendents who leave the road to work out its own salvation while they record its progress or degeneration, as the case may be. Statistics costing us thousands of dollars per year are laid away upon the shelf to gather the dust of ages, and after years of repose finally consigned to the flames. These statistical fiends appear to believe their only security is in being surrounded with such a mystery and maze of figures as will cause their colleagues to hold up their hands in amazement that any human being can exist in an atmosphere of such dense knowledge and remain perfectly sane.

Don't understand this committee to imply that all accounting officers are of this class. There are some of them who belong to the same as this committee and are, perhaps, too lazy to produce so much fire and perform such intricate work, but so long as the stockholders require nothing better we are secure.

In making tests our managers often require statistics as to mileage made

by special gears, brushes, truck wheels, trolley wheels and much other similar information. This is perfectly proper and necessary at times for the good management of the road, but it is a side issue and not to be considered in making up our standard forms. Not only should we seek uniformity in our reports, but in our methods as well. For instance, we find from the sample pages of some of the account books sent the committee that it is the custom on some roads when a bill is paid to charge it to the account for which the material was used, while on other roads the charge to expense is made when the material is received, and by others when it is used. This committee holds that the latter is the only correct method, as when material is purchased or paid for we are simply making an exchange of cash for another form of assets, and there is no expense until the material is used.

As an illustration of the incorrectness of the first method, let us take a road which should do a splendid Summer business, and during the month of August there is a county fair, which makes that the best month in the year. Then we will suppose that in the early Summer they purchased enough supplies to last them several months, amounting to several thousands of dollars, and the bills all fall due or are paid in August; by this method the charges for several months' expense all go into the expenses of one month. In consequence of such methods the reports for August will be very misleading, and whereas it should show up as the best in the year, it is a question if it is not the worst. Charges to expense should be made as closely as possible in the months to which they belong. When we are of one accord on matters like this and can agree upon a classification the balance of the work of standardizing forms of accounting will be very easy and soon accomplished.

There is but one other point upon which the committee wishes to touch, and that is the construction and equipment accounts. There is a great temptation for managers whose roads are running down on account of bad times, no travel, poor motors, bad track (all, of course, due to the mismanagement of his predecessor); we repeat, a great temptation to steer as many items as possible into the construction and equipment account. This is downright fraud, but it is done, nevertheless. Nor are the managers and accounting officers wholly to blame for this. Many of the roads are too heavily capitalized in the start, contracts are let with a huge profit for some one, and the road gets whatever may fall to its lot, sometimes only the broken crust. Burdened with a capital stock of $2,000,000, it could be paralleled by a better road, with better equipment, for perhaps half the money. Next come the bonds to the amount of another couple of millions, and secured by a mortgage upon the property. Half built in the first place, and with inferior equipment and with interest on a funded debt of more than the entire cost of the road, perhaps the officials of the company think that the game must go on, and that the particular part they are to play is to bluff it as long as possible until the receiver calls time.

The committee might dwell at length upon the distinction between the transportation charges and the maintenance charges, which was found to be somewhat confused on many of the reports sent in response to our request, but time is too short. We will say in conclusion, after careful examination of the blank forms and statements sent us, that 40 per cent are practically the same as the reports used by the committee and correspond in general detail with the classification submitted to you. Thirty per cent have practically the same headings, but in each there are instances where expenditures upon the property or maintenance charges are mingled in a confused way with those expenditures which add nothing to the property, either present or future. In five per cent the items are grouped under distinctive headings, but with no regard to the divisions as generally used. In 25 per cent, although the accounts are subdivided to a considerable extent and some of them have very elaborate statements, the grouping into distinct classes is entirely ignored.

From this you may see that, should the association adopt the classification submitted, 40 per cent of the roads would be all right as they stand and 30 per cent more would need to change but two or three items—principally putting the repairs of the power plant under the same head as repairs of the balance of the equipment, where it undoubtedly belongs. Twenty-five per cent more would but need to arrange their accounts systematically, instead of having them in a jumbled state, as most of them have the charges made to the proper accounts, but not arranged systematically in the reports.

Nearly 40 per cent of those replying to the circulars sent out by the committee expressed their approval of the classification sent them and also a desire that it should be adopted by the association. None said anything against it.

The Sawyer-Man-Edison Lamp Case in the Supreme Court.

The Sawyer-Man-Edison controversy over the patent for an improvement in incandescent lamps, in the use of a carbon made from fibrous material and in the form of an arch, horseshoe, or loop, after an existence of nearly 15 years, has reached the last stage of litigation and is now occupying the attention of the Supreme Court. The case went up on October 29 on appeal from the judgment of the Circuit Court for the Western District of Pennsylvania, announced by the late Associate Justice Bradley and Judge McKenna, on October 5, 1889, the parties to the suit being the Consolidated Electric Light Company, successor to the Sawyer-Man Company and the McKeesport Gas Company, a licensee of the Edison company. A final decree, holding that the patent issued to Sawyer & Man in 1885 was invalid, was entered October 10, 1890. From this decree the Consolidated company appealed. The briefs of counsel in the case are books of about 300 pages each, and they contain an epitome of the history of the art of electric lighting.

PUNCHING THE FACES OF LYNN TROLLEY CAR PASSENGERS.

A MODERN SYSTEM OF TRANSFERS ON THE LYNN AND BOSTON RAILROAD.

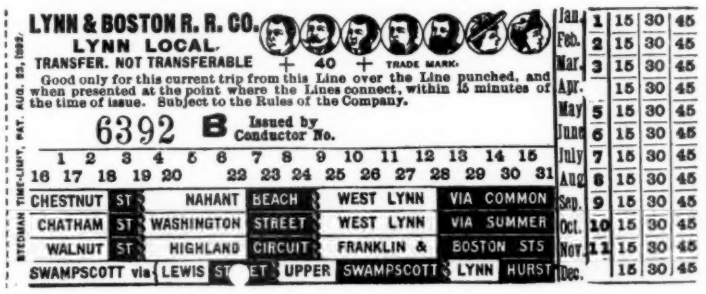
The electric railway at Lynn, Mass., has a system of transfer checks between the different lines which are not transferable—as to individuals.

These check slips are provided, rather than decorated, with seven typical portraits which are to identify the passenger by a punched face, much as the muscular conductor retorted to a disorderly passenger who said that his face was his ticket—"my orders are to punch all tickets."

Some of the more imaginative people consider these faces portraits of well-known citizens, the one at the left being claimed as a representation of Peter Breen, Esq., a leading lawyer and a member of the Common Council of the city government, and the next one of the police force, generally on duty at the square near to the main railroad station; following in succession, the one with side whiskers bears a close resemblance to Dr. Herbert W. Newhall, one of the leading young physicians; the middle is graced by Rev. James M. Pullman, D. D., the eloquent pastor of the First Universalist Church, who bears a close resemblance to his brother, George M. Pullman, save that his black hair is as yet untouched by silver threads; the full beard adorns a portrait of Dr. Frank F. Brigham, a physician in extensive practice, who takes a deep interest in public affairs, being a member of the Board of Education.

The ladies are exempt from personal mention, but the one on the right stands as a portrait of one of the ladies of society—perhaps the leader—whose fine presence is heightened by graces of culture and education, which have especially qualified her for her position as president of a woman's literary club.

The conductors have become so highly cultured by this portrait gallery that they announce the names of the streets in English instead of Chinook, and strike the bell punch with the fine touch of a pianist; and, moreover, it is alleged that some of them have become contributors to the society columns of the press.


LYNN & BOSTON R. R. CO.
LYNN LOCAL.
TRANSFER. NOT TRANSFERABLE
+ 40 + TRADE MARK.
Good only for this current trip from this Line over the Line punched, and when presented at the point where the Lines connect, within 15 minutes of the time of issue. Subject to the Rules of the Company.
6392 B Issued by Conductor No.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
16 17 18 19 20 22 23 24 25 26 27 28 29 30 31
CHESTNUT ST NAHANT BEACH WEST LYNN VIA COMMON
CHATHAM ST WASHINGTON STREET WEST LYNN VIA SUMMER
WALNUT ST HIGHLAND CIRCUIT FRANKLIN & BOSTON STS
SWAMPSCOTT via LEWIS ST ET UPPER SWAMPSCOTT LYNN HURST
STEDMAN TIME-LIMIT, PAT. AUG. 23, 1892.
Jan. 1 15 30 45
Feb. 2 15 30 45
Mar. 3 15 30 45
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May 5 15 30 45
June 6 15 30 45
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THE LYNN AND BOSTON RAILROAD COMPANY'S PICTURE GALLERY OF LYNN CITIZENS.

Electric Roads vs. Steam Railways.

As to how much electric railways are to be feared in the transmission of passengers and freight over long stretches of territory there is a difference of opinion among steam railway officials. Vice-President J. T. Odell, of the New York and New England, says that in his opinion electricity may come to be used between two large cities not more than 40 or 50 miles apart. But he does not believe electricity will ever supersede steam.

President O. D. Ashley, of the Wabash, says: "I am inclined to believe that, eventually, electricity as a motive power will supersede steam, but I do not think it will become an important factor in general rail transportation for long distances until the method of its application has been greatly changed and improved. It would be idle to deny great possibilities in the future of electricity, and I am a strong believer in its subtle potency as an agent in practical work, but I doubt very much whether man's intelligence has mastered its secrets sufficiently to count upon its constant and economical work for long distances.

"There are many serious objections to overcome before it can be considered a formidable rival for general transportation by rail. When these objections are overcome, I believe the steam roads are in the best position to take advantage of the power, and that they have such an advantage in construction and location that they will be the first to utilize it successfully. It does not appear to me that this condition is yet in sight, but as to this I may be mistaken."

General Manager Sargeant, of the Grand Trunk of Canada, says: "It is impossible to conjecture to what extent this wonderful agent may be developed, but, so far as its present adaptability is concerned, electricity would be too costly and could not be adapted to all requirements of the railway service. I found that to be so when considering the question in connection with the workings of a short piece of line between A. and B. not long since."

President E. P. Smith, of the Vermont Central, is a believer in the future of electricity, for he says: "So many astounding discoveries have already transpired in electricity one cannot but believe that sooner or later it will constitute the motive power in connection with rail transportation."

ITEMS OF INTEREST.

The Cohoes, N. Y., City Railroad Company have accepted the franchise granted to them several weeks ago.

The rumor that the new and old electric lighting companies at Atchison, Kas., would be consolidated is denied.

Since July 1, 1883, the Erie Telegraph and Telephone Company has paid 43 dividends, amounting to over $1,700,000.

After January 1, 1895, Kansas City, Mo., will reduce its electric lighting expenses from $26,000 to $15,000 a year if possible.

The Newark, N. J., trolley cars will be provided with life-saving fenders this week. There is a penalty of $50 a day for each car operated without a fender after November 1. Three different forms of fenders have been adopted.

BRAKE SHOES.

ABSTRACT OF A PAPER READ BEFORE THE AMERICAN STREET RAILWAY ASSOCIATION, ATLANTA, GA., OCTOBER 18, 1894, BY D. F. HENRY AND POWELL EVANS.

The street railway is quite as old in this country and abroad as the steam railway proper. Owing to the immensely greater size of the latter, however, early in its existence the importance of even insignificant items of cost in construction and maintenance was made clear. As the various original steam roads became consolidated into the present great systems, economy required on every hand the adoption of standards wherever possible for each system. This principle then extended to the adoption of standards, applying not only internally to each system, but externally to all systems.

The necessity for effecting standards was the prime cause of existence of the Master Car Builders' Association, which includes representatives from about every steam railway company in the United States. This association has collected most facts relating to the operation of all lines, and gradually reduced the greater number of details to standards. Among other net results at the present time are: The standard track gauge, coupler, wheel, and all such parts as must necessarily be similar to permit cars from any one line to be operated on any other.

If standards have proven simpler and more economical in every way for steam roads, the fact should apply with equal force to street railway operation. Up to 1886, when electricity began its revolution of the latter industry, the horse railways were often conducted in a rather careless manner, without due regard for petty economies. Until the last year or two, since the introduction of electric motive power, the enormous change and growth of the business has taxed its managers to the uttermost to care for the vital necessities for keeping their respective roads in operation. Now, however, when the power station, track, overhead line, car and motors are quite as perfect as similar parts of the steam railway, it is full time that this association should proceed to the adoption of standards for details.

Much has been done in this direction, but there is more still before you. We do not yet require the absolute steam railway standards, due to the interchange of cars over the various lines; but, with the growth of our suburban roads, it is not too much of a prophecy to predict this necessity in the near future.

It is not and probably never will be possible for all managers to agree on all points; but why should there be a differenoe of height of car floor above track or diameter of wheel on any two new or remodeled street railway lines? For our city and suburban service practically similar conditions exist all over the country, and like the steam railways we should have universal standards.

With the increase of standards comes a parity in the experience of those using them, and by the continued comparison of such experiences it becomes possible to approach perfection. There is a decrease in the cost of standard parts due to the elimination of constant experimental work, the production of the same article in large quantities and the increase of competitive manufacture.

When standards are adopted we need not carry a large stock of the various parts; and our men becoming familiar with these parts can save time and money in replacing them when broken or worn out.

I believe in standards throughout, but now wish to call your special attention to the subject of the "shape" and "material" for brake shoes. Brakes are applied to the track as well as the wheel; but as the latter practice, with few exceptions, is the rule, what follows has special reference to it.

An extract from a letter by Mr. W. W. Whitcomb aptly emphasizes the need of reformation in this matter. He says:

"Giving attention more particularly to rolling stock, I have been struck by the fact that there is a great lack of uniformity or standard in the numerous repair parts, a state of affairs which the manager knows only too well. Take, for instance, brake shoes and their connection with the brake mechanism, a subject which has been for a long time under discussion among the master car builders of steam railways, and one which is now beginning to prove of equal interest to the managers of street railways. Having occasion some time ago to visit a large and widely known truck manufacturing concern, I was shown nearly one hundred different styles of brake shoes, many of them differing only in some small detail, yet enough to unfit them for any truck except the one for which they were designed; and the end is not yet with them. At another truck company's works the managers failed to recognize a drawing of one of their own shoes made some years before. These may be exceptional cases, yet are examples of this widely existing evil. Roads which use altogether but one style of truck are very few, and consequently for each individual style and make there has to be on hand a supply of shoes made expressly for it and fitting no other, thus multiplying styles at increased expense. This condition of things, annoying in the extreme to the buyer, ought not to exist and a remedy for it should be adopted. That such a remedy can be found only in the adoption of some standard, suitable alike to all makes of trucks and their brake mechanism, will be readily admitted."

His logic seems perfectly sound.

The steam railways have reduced the parts of their brake gear to a standard of shape—the beam, link, release spring, hanger, clevis and shoe. They have found designs good enough for all to use, and so good that no one road seems able to improve upon them.

Having decided upon these standards, they specify them when buying rolling stock, get them and use them. Why should not our various truck manufacturing companies use a standard brake attachment—and if they can, why do we not decide upon one, and insist upon its use? As was stated above, the steam railways some time ago settled the matter of "shapes," so this point does not appear in their recent discussions on brake shoes.

As regards "material" they are still undecided, but are unanimous on one fact, viz.: That the best thing for one road is best for all. Is this not true also among our roads?

I will assume here that it is.

The Master Car Builders' Association has spent much time on this matter, and I will now read you in condensed form their last report of 1893.

After an introduction Mr. Cloud, secretary of the association, goes on to say:

In order to give some idea of the importance of this question from the standpoint of metal actually used in brake shoes per year, and entirely aside from the relative value of one metal or another in the service performed, some statistics have been collected from the various roads to show the annual consumption of metal for brake shoes on cars and engine tenders. While these statistics are not entirely accurate they are nearly enough so for the present purpose. Some roads have reported the actual pounds of brake shoes procured in the calendar year 1892, while others have reported the number of shoes; by taking the average weight per shoe as 21 pounds and reducing all to weight, we find that roads which were represented in the association in 1892 owning 320,000 cars, procured in the year 1892, approximately, 32,000,000 pounds of brake shoes for use on cars and engine tenders, or an average of 100 pounds per eight wheel car represented per year.

If we extend this ratio to all the cars represented in the association, or in round numbers to 1,100,000 cars, we will find that the annual requirements for brake shoes for cars and engine tenders owned by roads represented in the association by representative members is 55,000 tons. It may be said that approximately two-thirds of this metal is worn out in service and that the other one-third is returned as scrap, although this estimate of the average scrap weight is an estimate based on general knowledge and not on any absolute statistics.

To show that the roads reporting are representative roads throughout the country, it may be said that the 320,000 cars reported on are owned by such roads as the Union Pacific, C. & N. W., C., B. & Q., Penna. Co., Penna. R. R., L. S. & M. S., B. & O. R. R., E. T., V. & G., N. & W., O. &. M., Wil. & Weldon, N. Y., O. & W., and a number of smaller lines throughout the country.

It may also be added that of the total amount, 32,000,000 pounds reported by the roads reporting, five-sixths of the total used was reported as cast-iron, while approximately one-sixth was reported as Congdon, and a small number of the shoes of some different manufacture and under special names.

Most of the roads reporting as above also reported their consumption of driver brake shoes for the year, which were of different kinds, but which aggregated a total of 41,000 brake shoes, which average in weight about 50 pounds each, which would make 1,025 tons of driver brake shoes used by roads owning about one-fourth the cars represented in the association.

Referring to the shop test made by the C. B. & Q. R. R. Company and reported in the Proceedings of 1891, it seems hardly desirable to repeat here the results of these tests, for while they had their particular value at the time, the report of 1892 says that "investigations have convinced the committee that accurate conclusions from the shop tests would not be warranted without road tests," and as the shop tests have been reported in detail and the principal conclusions can be had by reference to the report of 1891, these tests will not be further considered at the present time.

It is perhaps correct to state that notwithstanding the use of wooden brake shoes in England until a comparatively recent date, the earliest valuable results of experiments on friction of metal brake shoes were presented by Capt. Douglas Galton to the Institution of Mechanical Engineers of Great Britain, some 15 years ago. The experiments were made with steel-tired wheels, and the results show very clearly the intricate character of the question of brake shoe friction under variable conditions of service in railway trains.

Boston "Tech." Wants the Franklin Fund for an Electrical Department.

General Francis A. Walker wants the trustees of the Franklin Fund of Boston to devote the entire amount, $365,000, to the creation of an electrical department for the Massachusetts Institute of Technology. General Walker recently appeared before the committee in executive session and strongly urged upon that body the feasibility of devoting the money to this end rather than to spend it in the purchase of land and the erection of buildings for schools for trade purposes. General Walker told the committee that there are at present 200 Boston boys attending the Institute of Technology, and the amount of the fund, if spent for an electrical department, would be of incalculable benefit to the residents of Boston, as well as being in direct line of the famous donator's studies and inventions. The committee heard General Walker and will decide later. It is understood that it is the sentiment of the trustees that General Walker's proposition should not be entertained.

LITERARY.

A very interesting publication is *Life's Calendar*, published monthly by Mitchell & Miller, at 19 West Thirty-first street, New York. An ingenious system of co-operation enables the publishers to secure the assistance of their readers in providing matter for the paper. Money prizes are offered each month for the best clippings or contributions to several departments. An attractive and simple puzzle also furnishes an interesting amusement, for correct solutions of which money prizes are given.

Power From Niagara Falls.

The Niagara Falls Power Company has asked the Board of Aldermen of Buffalo, N. Y., for permission to erect poles in that city for the purpose of transmitting electric power from Niagara Falls. Overhead construction is proposed, but the company will agree to put its wires underground whenever all the other light and power companies in Buffalo shall be ordered to do so.

General Electric Company.

It was reported last week that a very large portion of the work taken from the Lynn shops and transferred to the General Electric Company's works at Schenectady will be returned and hereafter manufactured at the factories in Lynn, Mass.

The new power station for the Nassau Electric Railway Company at Brooklyn, N. Y., will be 102 feet wide and 150 feet deep, and will be constructed entirely of iron and steel, the whole designed and built by the Berlin Iron Bridge Company, of East Berlin, Conn. The roof will be covered with their well-known patent anti-condensation corrugated iron roof covering.

POWER BRAKES VS. HAND BRAKES.

ABSTRACT OF A COMMITTEE REPORT TO THE AMERICAN STREET RAILWAY ASSOCIATION, ATLANTA, GA., OCTOBER 18, 1895, SUBMITTED BY E. J. WESSELS.

It will not be denied that hand brakes are inadequate. If power brakes could be furnished at the same first cost as hand brakes they would be universally adopted. The day is approaching when air brakes will be considered as separate equipments and will not be quoted in the lump sum named per car. There is no more reason for including brakes in the estimates than for including motors.

In a good air brake the brake cylinder is constructed of iron and contains a piston and piston rod, which is attached to brake levers under the car. The rear end of the brake cylinder is made air tight and connected with the train pipe, so that when air is applied from the reservoir it forces out the piston in the cylinder and sets the brakes.

The power of the brake cylinder can be easily calculated and is equal to the square inch area of the piston multiplied by the air pressure carried in the reservoir, hence:

Brake cylinder six inch diameter and 30 pounds pressure gives 848 pounds power at the brake cylinder.

Brake cylinder seven inch diameter and 30 pounds pressure gives 1,154 pounds power at the brake cylinder.

Brake cylinder seven inch diameter and 32 pounds pressure gives 1,231 pounds power at the brake cylinder.

Brake cylinder eight inch diameter and 35 pounds pressure gives 1,759 pounds power at the brake cylinder.

This may be increased by using larger diameters or higher pressure, and by arrangement of brake levers any additional power may be obtained. At the same time it can be graded suitably to the weight and speed of car.

A 28 foot closed electric car weighing, without passengers, 20,000 pounds, and running at 10 miles per hour, has over six times the energy to overcome when brakes are applied that a horse car has, weighing one-fourth as much and traveling at less than one-half the speed. Moreover, when horses were employed there were 10 feet extra length in which to stop car. This extra length is no longer available since the advent of electric cars.

Probably 75 per cent of recorded accidents is chargeable to inefficient brakes. Statistics of this sort are hard to tabulate, and some records show even a higher percentage. While hand brakes often stop cars quickly, they do so by consuming excessive energy. This means waste and increases maintenance account. Then, too, it is impossible for a motorman to maintain his maximum strength for a long time. In active service he has to apply brakes between 250 and 400 times daily. He can only exert his maximum strength spasmodically and temporarily, even when aided by the weight of his body.

When hand brakes are used it is necessary to have a separate brake man for each trailer. When an air brake is used these extra men are entirely dispensed with. On a train of a motor car and two trailers, if air brakes are used, only one motorman and one conductor are necessary. If hand brakes are used to control the same train, four men instead of two are necessary. This means a saving in wages of at least $25 a week, and will soon pay for an air brake equipment.

Air brakes are provided with reserve power stored in reservoirs, and, by having large enough capacity, the air pressure required for breaking becomes practically inexhaustible. The air pump of a thoroughly good air brake is most economical in operation. It requires no power when car is starting or when it climbs grades. As it takes 10 times the power to start a car that it takes to keep it going, the advantage of this is obvious. A good air brake is so compact that very little room is required for it under car body. It has no cumbersome or complicated machinery to get out of order. It works automatically. It needs much less attention than an electric motor gets. It is only necessary to keep the mechanism clean and in order, and to lubricate pump regularly. No hinges or springs annoy inspectors or employés. A good air brake pump, the moment it has compressed sufficient air, cuts out and runs in free air with the axle. A good air brake entirely replaces a hand brake. The hand brake may be left on the car, and the air brake can be so attached as to leave the hand brake available should it be required. A good air brake requires no expert to operate it. It is so simple that a child can work it. This being so, a railway manager is not restricted to hiring men of a certain height or weight, for when work is done by compressed air instead of muscular strength, no Samson is required to work the handle.

The all-important question is whether the first cost of a good air brake is too high or not, in proportion to the advantages gained. No accountant can figure accurately how many dollars of damage claims will be avoided; nor how much revenue will be increased by the quicker schedules made possible with air brakes (for even seconds count); nor what the gain in labor account will be by not being restricted to hiring any particular height or weight of man; or how much the life of car body, truck and motor will be prolonged. There is a decided gain from whatever point we view the air brake, and with an air brake an employé is armed at all points.

Will it not be worth your while to give this braking matter earnest attention? If but a few of this audience will determine to investigate the advantages of the air brake over all other forms of brakes, this paper will not have been prepared in vain.

Robinson Four-Wheeled "Ajax" Truck.

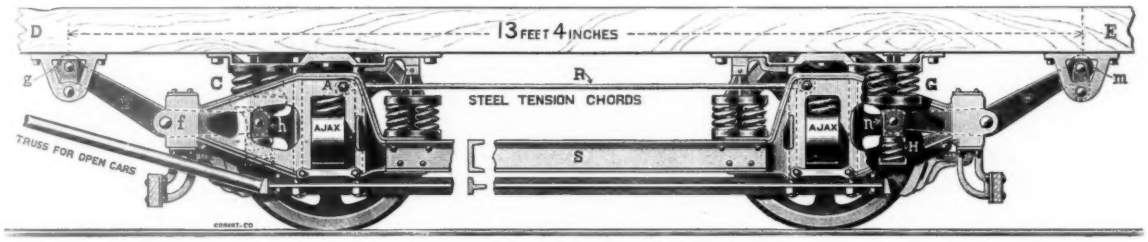
The Robinson Electric Truck and Supply Company, 620 Atlantic avenue, Boston, Mass., have recently placed upon the market a new and improved four-wheeled truck for electric cars which they have named the "Ajax." It is shown in the accompanying illustration. Referring to the cut the parts are as follows:

The saddle casting A forms, at *f*, a fulcrum for the bent lever B, one end of which is flexibly connected to the car sill, as shown at *g*, while the other end of said lever supports the springs C, upon which the car body rests.

Operation—Assume that the end D of the car body descends, as in teetering. This depresses the outer end *g* of the lever B, raises the inner end *h* of the same and compresses the springs C from the bottom, thus resisting the downward tendency of the end D of the car. Now, if the end D of the car descends in teetering, the opposite end E, of course, must ascend, raising the outer end *m* of the lever F, lowering the inner end *n* of the same, thus removing support from the springs G and compressing the cushion spring H; all of which resists the rising tendency of the end E of the car. It is evident, then, that as the ends of the car cannot rise or descend independently, teetering is practically prevented.

Construction—Frame, lower side members: Steel channels S hot riveted to lower part of saddles. Steel tension rods R connecting upper part of saddles. Truck ends: Heavy steel channels.

Brakes—Provided with lever hangers, adjustable release springs and anti-rattlers.



ROBINSON FOUR-WHEELED "AJAX" TRUCK.

ELECTRIC RAILWAY NOTES.

The trolley road at Jacksonville, Fla., will be in operation about December 20.

The Niagara Falls Whirlpool and Northern Electric Railroad is about ready for operation.

There is renewed talk of connecting Newport, R. I., and Fall River, Mass., by an electric road.

The Newburgh, N. Y., electric railway will commence running its freight and express business this week.

The work of surveying the line for the Cincinnati, Middletown and Dayton electric railway has been begun. Track laying will begin about January 1.

Fear of the coming of a trolley road through Main street, Hackensack, N. J. (and every one concedes that it will come), does not depress values in that thoroughfare.—*N. Y. Evening Post.*

The Supreme Court of Ohio has decided that the Cincinnati Inclined Plane Railway Company, which operates an electric road between Fountain Square, Cincinnati, and Carthage, Ohio, has no franchise and is a mere trespasser upon the streets of the city.

A franchise has been granted for an electric railway running from the Cuyahoga county line and designed to connect Elyria and Cleveland, Ohio. The road will be finished next Summer and will be 23 miles long. It will be built by the Berea Electric Company.

George B. Kerper, of Cincinnati, is the prime mover in a project to construct an electric railway from Toledo to Findlay, Ohio, a distance of 50 miles. The prospective line is to parallel the Ohio Central railroad and traverse the rich gas territory between Toledo and Findlay.

The annual meeting of the Pittsfield, Mass., Electric Street Railway Company was held last week. A pleasant announcement was the declaration of the first dividend which the road has earned, six per cent. The year has been prosperous, the net earnings being nearly $6,000.

James W. Shepp and Daniel B. Shepp, owners of the Citizens' Passenger Railway, of Norristown, Pa., have become the purchasers of the Norristown Passenger Railway Company and the Montgomery Passenger Railway Company, and have the entire issue of stock of the Norristown, Bridgeport and Conshohocken Traction Company. All the companies will be merged into one, and the new owners took possession November 1. The price paid, it is said, was over $100,000.

Meetings held within the last few days to promote the building of electric railways in the counties of Maryland give ground for the expectation that some new lines are about to be constructed, independent of the rapid transit systems in Baltimore. A road is projected from Annapolis to Bay Ridge, and another from Emory Grove to the battlefield of Gettysburg; and, while neither project has passed beyond the preliminary stage, the prospect is good for the construction of both roads.

A strong protest is being made against the running of electric cars on the highways of Deal Beach and South Elberon, N. J. The property owners along the proposed route take the position that electric roads, being very profitable, should be willing to purchase the right of way through property at fair and equitable valuation, and not obstruct the narrow roads laid out in the olden times, which are used both for pleasure driving by seashore visitors and also by truckers who supply Asbury Park and Ocean Grove with farm produce. On some portions of the proposed route the old-fashioned roads are so narrow that an electric railway would completely obstruct the use of it for ordinary travel.

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A nice thing about the telephone is that if the other fellow's conversation gets too personal or too torrid, you can simply hang up the receiver and end the confab pleasantly—for yourself.

A former officer of one of the Brooklyn, N. Y., electric railway companies has made complaint to the New York State Railroad Commissioners that several Brooklyn roads have made wrongful statements in their annual reports. This is a serious charge and it would be interesting to know the motive that inspired the complaint.

Savannah, Ga., still enjoys the cheapest street car travel in the world. The fare is one cent over all lines in the city, except one, on which the fare is two rides for a cent. It is estimated that 30,000 persons take a five-mile ride each day. The cause of the low fares is a war between two rival companies, which may yet result in premiums for passengers being offered.

Mr. Walter K. Freeman, who is not without notoriety among electrical men, is endeavoring to achieve further fame by patent suits which he has instituted against the leading electrical manufacturing companies. He has had agents recently in Racine, Wis., where he once lived, endeavoring to secure evidence that he was the inventor of the transformer. Is this another Wellington Adams case?

The applications of electricity to industrial processes is daily increasing. One of the latest of these is the development of a new method for coloring leather by electrical action. The hide is stretched upon a metallic table and covered, except at the edges, with the coloring liquid. A difference of potential is established between the liquid and the metallic table. The effect of the electric current is to cause the pores of the skin to open, whereby the coloring is enabled to penetrate deeply into its tissue.

An interesting and excellently illustrated article from the pen of Mr. Russell B. Harrison appears in the ELECTRICAL REVIEW this week, presenting for the first time views and description of the six processes used in his high class street railway track construction at Terre Haute, Ind. It deserves special attention from street railway owners. Mr. Harrison is to be complimented on the very thorough and comprehensive manner in which he has described this important and exceptionally modern piece of work.

WALL STREET AND THE ELECTRICAL STOCK MARKET.

The market for stocks this week has been almost purely professional. The only feature was the decline and subsequent rally in the coal stocks, which turned the tide toward slightly higher quotations. The bears persistently hammered Northwest for a possible effect upon the general list, but were forced to cover their short contracts without profit. No gold was exported, although exchange is high and unchanged, and unless there is a weakening in quotations, shipments the ensuing week are probable. The strongest feature of the situation is the bond market. There has been a steady increase in activity and a material gain in values. Much of the money received from November interest is being employed in this way.

General Electric established the lowest prices early in the week. Its close was some two points higher than the lowest. It was comparatively neglected by bear operators, whose attention was concentrated in the granger stocks. The usual stories of a sinister nature regarding the stock were in circulation. They had no following. I am told on good authority that insiders have been heavy buyers of the stock on the decline and that they will hold on to their purchasers until the price crosses 45.

Advices from Schenectady are to the effect that it will soon be necessary to send some of the orders to the Lynn plant in order to relieve the pressure on the Schenectady plant.

Edison Electric Illuminating opened the week at 100½, ranging about that figure on limited sales. American Telegraph and Cable sold at 91 on Monday and in the latter part of the week 89¾. The quotation on North American was 4 to 4½. Postal Telegraph was bid 52 and held at 60.

The Erie Telephone and Telegraph dividend of 1 per cent is payable November 10. The books close November 1 and open November 10.

On the Boston Stock Exchange Bell Telephone weakened somewhat, declining from 196 to 194 on moderate transactions. Erie Telephone showed strength, advancing 2 points to 54. General Electric preferred quotations were barely nominal. But 8 shares were sold, the price being 63. New England Telephone was steady at 67. Fort Wayne Electric sold at 2 to 2½. Westinghouse common at 35½ to 36, and the preferred at 52¾ to 53 were unchanged.

A meeting of shareholders of American Bell Telephone will be held on November 15 to pass upon the acceptance of the act authorizing an increase of capital stock from $20,000,000 to $50,000,000. The Commissioner of Corporations is to fix an upset price at which the stock may be offered to shareholders for not less than 15 days nor more than 30 days, and if shareholders decline to subscribe, the stock is to be sold by auction to the highest bidder.

The August statement of Mexican Telephone Company shows: Gross, $8,360, decrease, $13; net, $3,152, decrease, $227. For the half year:

Gross, $53,720, increase, $4,038; net, $23,061, increase, $1,056. The subscribers now number 1,978, increase of three. There has been a loss of 124 subscribers during six months, with a loss of $866 in income.

It can be officially stated that one of the largest contracts for furnishing motors and generators was signed last night between the General Electric Company and Mr. Charles T. Yerkes, to supply the North Chicago Street Railway Company and the West Side Street Railway Company with electrical power.

The contract at the start calls for the delivery on or before March 1, 1895, of 600 motors and 3,600 horse-power generators, at which time Mr. Yerkes expects to have his power house ready to start the different lines.

It is the intention of Mr. Yerkes to equip all his traction system in Chicago with electricity, and the contract is said to call for the General Electric Company to supply the same.

The present contract amounts to over $500,000, and it will in all probability amount to about $4,000,000 before Mr. Yerkes has completed his system, as he controls virtually all the railroads, both surface and elevated, in Chicago with the exception of Capt. R. Somers Hayes' West Side Metropolitan Company.

The motors and generators will be delivered subject to order, and all the cars equipped with them so as to be ready when the power houses are completed.

The General Electric Company has now on its pay roll at Lynn and Schenectady about 4,700 men, and the force will have to be increased considerably to fill the contract, besides other large ones that have been lately secured.

During the month of October the General Electric Company sold about 800 motors and generators of different styles, which amounted to about $700,000 in value. BAIN.

New York, November 3.

PERSONAL.

John Scullin, the St. Louis street car magnate, is running on the Democratic ticket for State Senator.

Mr. E. G. Bernard, of the E. G. Bernard company, Troy, N. Y., was in New York last week.

Prof. Edward Weston, of the Weston Electrical Instrument Company, Newark, N. J., will soon make a trip to Europe for his health.

Mr. H. L. Shippy, New York manager of the John A. Roebling's Sons Company, is expected to return this week from his extended European trip which he began last Spring.

Mr. W. J. Morrison, for many years New York State agent for the Fort Wayne Electric Company, of Fort Wayne, Ind., has associated himself with the United States Electric Forging Company, of New York city.

President Wm. H. McKinlock, of the Metropolitan Electric Company, Chicago, was in New York last week on business. Mr. McKinlock says that business has steadily increased with his house since the day the Metropolitan company was formed. They have just produced a very fine catalogue of electric railway supplies which may be had by those interested.

OUR BOSTON LETTER.

The Campbell Electrical Supply Company, of 104 High street, this city, are sending out neat little cards calling attention to the recent reduction in prices of their celebrated "Century" insulating tape and "Century" insulating paint. Largely improved manufacturing facilities have made the reduction in price possible, and prospective purchasers would do well to communicate with the Campbell Company before placing their orders.

The Thompson-Brown Electric Company gave a very enjoyable "house-warming" during the afternoon and evening of Thursday, October 25, at their new store, 97 High street, which was well attended. The occasion was the formal opening of the new establishment and the introduction of a new supply house in the local field. The active members of the firm are Geo. Thompson, Jr., president; E. F. Ayrault, secretary; and Maybin W. Brown, treasurer. F. E. Pettingell and H. P. Brown will also represent the concern. The Thompson-Brown company will act as sole New England agent for the E. S. Greeley & Company, of New York.

The most important event which has occurred recently in Boston electrical circles is the incorporation of the Anchor Electric Company, which has purchased the entire business of the Brown Electric Company and the Iona Manufacturing Company and the supply business of the Hawks Electric Company. All three of these concerns have been doing a handsome business and each has an extensive clientage, which, when united under one head, will make the new firm an important factor, and place it in the front rank of the supply houses of New England. Headquarters have been established at 71 Federal street, where the main offices and salesrooms will be located, and the extensive factory of the Iona Manufacturing Company, at 336 Congress street, will continue to be used for all manufacturing work. A large force of men is now employed there. The officers of the Anchor Electric Company are H. C. Hawks, president; Norman Marshall, vice-president; and P. M. Reynolds, treasurer. All are young men, full of energy and enterprise, and with an abundance of capital and a solid practical experience in all branches of their business, start in with the brightest prospects for success.

The new central office of the New England Telephone and Telegraph Company, at 7 Chardon street, which will be known as "Haymarket" station, is now about completed and will be open for business before the end of the year. This station has been built and equipped to relieve the press of business in the down town district, and will open with 1,000 subscribers, who will be transferred from the Milk street office. It represents all of the most modern ideas in telephony, and has facilities for handling 2,500 subscribers, should the necessity arise. The building is of brick and iron, four stories high, and is finished in hard wood. It contains every possible convenience for the handling of business and for the comfort of the operators. Storage batteries are used to supply the operating current and are charged from the Edison circuit. H. G. T.

Boston, November 3.

The Fuller Double Voltage Dynamo.

The Fontaine Crossing and Electrical Company, of Detroit, Mich., are the manufacturers of the Fuller double voltage automatic constant potential electric machinery, which possesses several novel features. The dynamo is practically two machines in one, and can be connected to any existing three wire system without any change in the wiring, as well as to a two wire system, for use at either 220 or 110 volts. Motors can be run, in a building equipped for electric power, at 220 volts, and the lighting system of the building can be run at 110 volts from the same machine.

Where electric cranes and portable electric drills are used, a machine of this description would possess great advantages, because a current can be carried to a great distance for power purposes on economical sized wire, while the remainder of the machine can be used for lighting purposes. The same is true in business blocks where electric elevators, pumps, electric ventilating fans and small machinery are used. The company is at present building this type of generator from 10 to 100 horse-power, and generators of larger sizes can be supplied at short notice.

With the Fuller dynamo, where one machine does the work of two, several important economies are effected; one foundation, one belt and one clutch pulley as well as actual floor space are saved.

Among the claims made for the Fuller machine by the Fontaine Crossing and Electrical Company are that current can be taken from the machine in any desired quantity; for example, in a 100 horse-power generator the current can be taken at 110 volts or at 220, while any intermediate number of horse-power from zero to full load can be taken at either voltage or both at the same time; and they guarantee all machines to regulate within two volts from zero to full load with brushes practically at a fixed point of commutation.

Particular attention has been given to the mechanical construction of this machine, ensuring long life. The bearings are long and large in diameter. The field windings of the machine are of very high resistance, while the armature windings are very low. All machines are guaranteed both mechanically and electrically for the period of two years from the time they are put in service, and any defect that may develop that is traceable to faulty construction will be made good at the company's expense. The bearings are self-oiling and self-aligning, ensuring perfect lubrication.

The Messrs. Biddle Make a Change.

William Biddle, Jr., and James G. Biddle announce that they have severed their connections with Queen & Company, of Philadelphia, as joint managers of the physical and electrical departments.

James G. Biddle has located at 119 South Fourth street, Philadelphia, where he will be glad to hear from prospective purchasers of scientific apparatus. His office hours are from 9 A. M. to 2 P. M.

The Feeder and Main Suit.

The following document tells of the latest development in the famous feeder and main patent suit:

At a stated term of the United States Circuit Court for the District of New Jersey, held in the United State Court and Post Office building in the city of Trenton on the 26th day of October, 1894.

Present: Hon. Edward T. Green, Judge.

The Edison Electric Light Company *vs.* Westinghouse, Church, Kerr & Company, in equity.

Decree herein having been entered the 25th day of April, 1893, and the transcript of the record having been taken into the United States Circuit Court of Appeals for the third circuit by virtue of an appeal, and the said United States Circuit Court of Appeals having on consideration thereof on the 18th day of September, 1894,

Ordered, adjudged and decreed that the said decree of this court be reversed with costs and the mandate of the said United States Circuit Court of Appeals, dated the 18th day of October, 1894, being now here before this court, on motion of Kerr & Curtis, Esqs., solicitors for defendant;

It is ordered that said mandate be filed herein and that the said decree of the said United States Circuit Court of Appeals be and the same hereby is made the decree of this court, and

It is further ordered that defendant have judgment against the complainant, the Edison Electric Light Company, for the sum of Forty-two dollars and sixty-five cents ($42.65), amount of costs taxed herein by the clerk of the United States Circuit Court of Appeals, and have execution therefor; also that defendant have judgment against the complainant, the Edison Electric Light Company, for the further sum of six thousand four hundred and eleven dollars and fifty-seven cents ($6,411.57), amount of costs taxed by the clerk of this court herein and have execution therefor.

(Signed) EDW. T. GREEN, J.

[Seal United States Circuit Court.]

A true copy.

(Signed) S. D. OLIPHANT, Clerk.

What's a Dynamo?

I stood to-day in the presence of a whirling dynamo
Which was coupled to an engine that set it running so,
And the engine was connected with a boiler made of steel,
In which was water, and *under* a fire hot to feel.

The heat came from the union of fuel and of air,
And that made steam of water and ran the engine there,
Which set in rapid motion the complex dynamo,
And that produced a current, but whence, I do not know.

I know there was a current, I saw it sparkle there,
I saw it run machinery, I felt it in the air;
I saw it in the night time turn darkness into day,
I heard it tick a message to people far away.

Endeavoring to discover whence that current came,
I turned my whole attention with deep and earnest aim;
I traced the stream of power from fire to dynamo,
But to save my life I couldn't an inch beyond that go.

I saw the compound armature whirl within a ring,
But save at the axle ends it didn't touch a thing;
And yet somehow it gathered and on the world bestowed
A flood whose stream electric in fiery current flowed.

It seemed to be upcatching—as a pump from a living well—
A flood whose springs lie hidden beyond man's wit to tell;
'Twas strange beyond expression to see that quaint machine
Drawing a stream of power from a reservoir unseen.

And the more I thought about it, 'twas stranger every hour,
That men should go to pumping the firmament for power;
I may be quite mistaken, but it strikes me as below:
To get something out of nothing, use a dynamo.

T. BERRY SMITH.

Fayette, Mo., October 30, 1894.

MODERN T RAIL TRACK CONSTRUCTION.

A REPORT ON THE INSTALLATION OF THE TERRE HAUTE ELECTRIC RAILWAY'S TRACK CONSTRUCTION SUBMITTED TO THE AMERICAN STREET RAILWAY ASSOCIATION, ATLANTA, GA., OCTOBER 18, 1894, BY RUSSELL B. HARRISON.

It gives me pleasure to respond to the request and invitation of the American Street Railway Association, extended last year at the Milwaukee convention, to make a report at the Atlanta convention on "The T Rail Track Construction of the Terre Haute Electric Railway." This is not alone from the fact that it is very gratifying to have so influential a body as the American Street Railway Association thus recognize the pioneer and successful work of the Terre Haute road in the important field of track construction, but more especially from the standpoint that having given several years' study to street railway track construction, not following as others lead, but working on the problem with new and original ideas, I believe the presentation of the results that have been secured will not only prove of great value and interest to the members of the association in showing how T rail track construction may be successfully laid in paved streets, with the hearty approval of the public, and will give the members a standard to follow that will enable them to save thousands of dollars in expensive experience and in costly experiments. If but a small part of my expectations in this respect shall be immediately realized, the seed will be sown and will produce a great harvest, bringing ample reward for our efforts and work on the problem.

The present standard of "all steel" T rail track construction of the Terre Haute Electric Railway not only has no equal in this country, but is so far in advance of anything yet attempted in the way of street railway track construction that I feel a brief outline of our work on the problem, prior to reaching the present standard, will not only not be out of place, but will prove of real interest. I am aware, gentlemen, that these are strong words to be used in connection with our present track construction, and that my opinion may not be immediately shared by many members of the association, but I am confident that all members making an actual inspection of the track will share my opinion as to its smoothness, solidity, durability, permanency and general merits, and the great advantages and public popularity of the smoothly finished asphalt and brick paving laid in connection with it.

Terre Haute is an anomaly among the cities of this country on the subject of street railway track construction. It is the only city that would not permit girder or grooved rail in its streets, and would make as great a fuss now on the subject as the average city would do if an attempt were made to lay T rail track. This will seem a strange condition, but to the company it is a very pleasant one, making its relation with the city on the subject harmonious, and permitting the road to secure, with popular approval, the best and most durable form of rail at the least cost. This feeling, the approval by the public of a T rail, did not exist at the start, but was brought about gradually, assisted by the greatest of all teachers—experience. It would not be in existence to-day if the management of the road had not at all times realized that public opinion and the approval of the public were valuable assets to a street railway company, and worth every earnest effort to hold and maintain. Our motto has been, not how cheaply, but how well we could construct our tracks in the streets. The public have appreciated our efforts and sustained us loyally.

There has been in the past too much attention paid to motors, generators, cars, power houses, etc., and too little to the foundation for successful and economical operation—a perfect track. The development of electricity as a motive power for street railway service was very rapid, and it is only natural that the inexperienced should be misled in their hurry to change power and have an electric road that would make them very rich in a year or two. Is it any wonder then that many roads should find after a year or two of experience that the track was too light for the cars and motors and the cars and motors were too heavy for the track, and that both were worn out and required rebuilding at time when the great panic had reduced traffic to its lowest point? Light and abused track and worn out cars and motors, coupled with reduced traffic, have brought to too many roads the unwelcome guest—the receiver.

It seems strange that street railway track construction should drift so far away, in theory and practice, from steam railway track construction. One had but to study the wonderful display showing the development of track construction in the Transportation Building, at the World's Fair, to acquire a liberal education on the subject. The Terre Haute road has, indeed, had a fortunate experience. Its management early realized that successful track construction should approach as far as possible and not deviate from, further than necessary, the best steam railway track construction. So to-day the Terre Haute road is an all T railroad and every block of track in paved streets of so durable a character that it will last for years, with a minimum of repairs.

Terre Haute, although a small town at the close of the great Civil War, was very enterprising and determined to have a street railway. A company was incorporated for this purpose in 1866, with ample capital, and commenced to lay track early the following year. It is an interesting fact in connection with the present low price of steel that the side bearing, flat iron rails purchased by the company in 1867 cost $108 per ton. These rails were used about 20 years and then 38 pound girder rails were substituted. The franchise of the company does not contain any requirements as to the style, character or weight of the rails. While there has been no expression from the public on the subject, the management feared that the general and popular prejudice against the use of T rails in the streets would appear in Terre Haute. They therefore hesitated about so radical a change, but appreciating the good results that would come from the use of such a rail, they decided to place a trial order. No publication was made of the fact that it intended to use T rail. The first T rail laid by the company was on South Third street, in the Fall of 1890. This rail was laid preparatory to changing the motive power from horse to electricity. The old girder rail on Third street was taken up, new ties distributed, and when everything was ready the T rail was distributed in a matter-of-fact way, as if it was the only rail that could be used, and a force of men put to work in laying them. The mayor of the city came around shortly, reports having reached him as to the company laying a steam railway track, and when he saw the reports were true, he said with some excitement, "What are you doing here, putting a steam road in our streets?" The superintendent, who was on the spot, was equal to the emergency, and replied pleasantly, but earnestly, that the track was being built for an electric railway. The Mayor replied that that could not be the case, as the rails were steam road rails. The superintendent then informed him that these T rails were the only rails adapted for the successful operation of electric railways, and while it appeared to be the steam road rail, it was in reality very much lighter (the section being 40 pound T) than a steam road rail. Further explanations satisfied the mayor and convinced him as to the merits of the T rail. In a short time he became not only interested, but enthusiastic, and brought councilmen to see the rail and explained to them its advantages for electric street railway service. They in turn brought prominent citizens and others to look at it, and thus by tact and good management the T rail was introduced.

A description of the laying of this first T rail track will prove of interest. It was a 40 pound T rail laid on oak ties 5x7x7 with three feet space from center to center. The rails were laid without proper regard to having the end of the rail rest on a tie. Planks 2x6x12 were laid on

FIG. 1.—MODERN T RAIL TRACK CONSTRUCTION. FIRST PROCESS. ROLLING THE ROAD BED AFTER EXCAVATION.

FIG. 2.—SECOND PROCESS. PREPARING TO RECEIVE BROKEN STONE. SETTING GRADE STAKES.

FIG. 3.—THIRD PROCESS. LAYING FIRST EIGHT INCHES OF BROKEN STONE CONCRETE.

FIG. 4.—FOURTH PROCESS. LAYING THE TRACK. READY FOR TAMPING WITH LAST FOUR INCHES OF BROKEN STONE CONCRETE.

both sides of the rail. On the inside the planks were nailed to the ties, and on the outside blocks were nailed to the ties to raise the plank to a level with the rail, to provide vehicles an easy crossing. Ordinary flat splice bars were used with the rails. The rails were bonded with three-eighths inch galvanized bond wire with a single bond to the joint. They in turn were wired and soldered to a supplementary wire of one-quarter inch, galvanized, stranded iron wire, each alternate joint being soldered and wired from both rails of the track. In the single track the supplementary wire was in the center of the track, and in the double track between the tracks. The track was covered in with good gravel.

One year's experience demonstrated that planking was unnecessary; that gravel, which is found in great abundance under and about Terre Haute, made—with a little clay that is found above it—a superior substitute for the plank and protected the rails better in enabling vehicles to pass along and to cross the track easily and without injury. This substitute only required occasional attention in filling up low spots to maintain a level roadway. In two years the planks were badly decayed and warped up at the end, and as the track was thoroughly overhauled at that time the planking was taken up and gravel substituted.

At the end of two years' service of the track it was found in making repairs that the galvanized iron supplementary ground wire was rusted out and gone for various distances, making a return circuit an impossibility, and as we only had the rails to depend upon, which, in themselves, for this purpose are not sufficient, this trouble not only reduced the efficiency of the circuit, but caused frequent burn-outs of the armatures and fields. It grew to such an extent that it was found necessary to rebond this track, and it was decided at the same time to dig up and repair the entire track and increase the number of ties by one-third, and at the same time give careful attention to having the ties under and properly supporting the rail joints. Tinned No. 00 copper wire was substituted for iron as the bond and supplementary wire. Good gravel, with a little clay, was substituted for the plank along the rail, and the substitute has given very much better service than the planks have ever done. This section of the road as rebuilt is in daily use now and giving good service.

The era of street paving did not set in, in Terre Haute, until 1892. This was not because Terre Haute lacked in enterprise and progressiveness, but was because the town was situated on a high bluff fronting the Wabash River, and had, with the gravel subsoil, good drainage and good streets. When it was decided to pave Wabash avenue and Main street with brick for 15 blocks, it became necessary for the company to take up its girder rail. Our experience thus far with T rail had been so satisfactory that it was decided to continue its use on the following method:

Rail—About this time the Illinois Steel Company brought out their 60 pound Shanghai T rail, and as it was five and three-quarter inches high, permitting paving without chairs and direct spiking of the rail to the ties, it was very promptly adopted and ordered.

Ties—Carefully selected oak ties 5x7? were used.

Foundation—After excavating for the track the ground was rolled by a heavy 14 ton steam road roller. Then six inches of broken stone was placed in position as a bed and rolled by the 14 ton steam road roller.

Track—Then the ties and rails were placed in position and raised to grade by tamping screened broken stone underneath, spaces between ties were filled with broken stone and rammed to position.

Bonding—Single bonds were used of seven-sixteenths inch galvanized iron wire and a supplementary wire of No. 00 tinned copper wire.

Paving—On top of the broken stone screened sharp sand was placed, and with one inch hose this sand was washed into the interstices of the stone. After drying, the sand was brought up to an even surface by a fresh deposit, and it was then smoothed to even surface and the desired thickness by a mould board. Then vitrified bricks were placed in position, leaving them somewhat higher than the rail. They were driven into the cushion of sand by means of hand rammers, with a square piece of boiler plate placed on top of them to force all to the proper level. The sand cushion permitted the bricks to crown evenly from center towards each rail to afford proper drainage. A special brick with one corner cut off with sloping angle to give space for flange of wheel to run in was laid next to the rail. These bricks were not the shape of the special nose brick now used, and only set against the lower edge of inside of head of rail. The space between the brick and web of rail was filled with grouting. Bricks of regular size were laid between. After the bricks had been rammed and rolled to proper position, a grout of best screened sharp sand and Portland cement with water, made to such flowing consistency as to percolate all the crevices, was poured over them, and by brooms pushed into the openings. When thus wet, the bricks were solidly united and they cannot be separated, except with great difficulty. A finishing coat of sand was thrown over the entire surface and traffic kept off for one week. After thoroughly setting, the sand was swept off and the street opened for traffic. The street between the tracks and curb stone, as well as between the tracks, is one solid mass of concrete and brick from center of street to curb and will sustain great pressure. Since this track was laid our experience with it has demonstrated that it could have been improved in one particular, viz.: The sand and broken stone should have been united with cement into regular concrete. For we have found since the paving was completed that the use of the water on the sand did not wash it thoroughly into interstices of the broken stone. In time the sand dried and settled down into the spaces, and while the ties and the paving immediately over them have remained firm and solid the paving between the ties has settled slightly, without breaking or disturbing the concrete holding them together. This track laid in Wabash avenue, the principal street of the city, has had two years' severe service and has been thoroughly tested in every par-

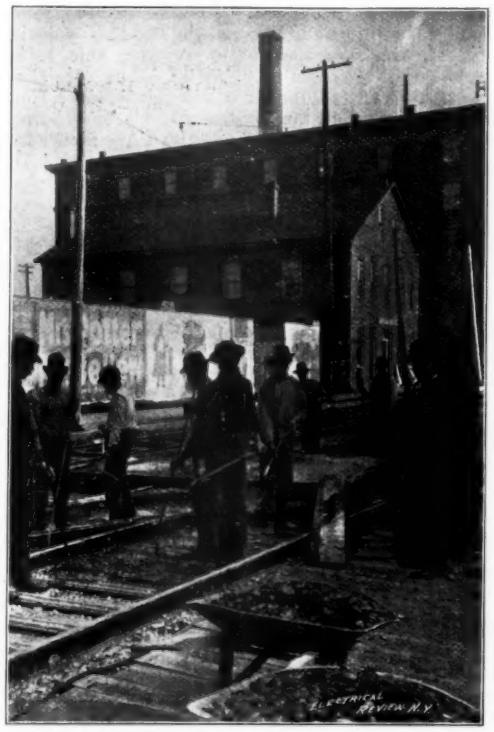

FIG. 5.—FIFTH PROCESS. TAMPING TIES AND RAILS.

FIG. 6.—SIXTH PROCESS. TRACK READY FOR BRICK PAVING. TIES COVERED AND RAILS SET IN BROKEN STONE CONCRETE.

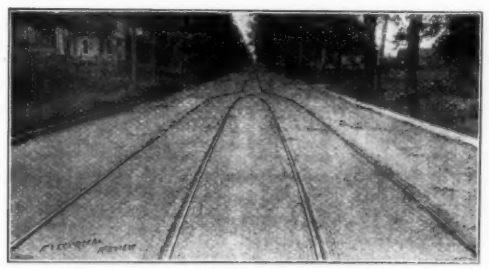

FIG. 7.—ASPHALT PAVED STREET. HAYDENVILLE BLOCKS INSIDE AND OUTSIDE RAILS.

FIG. 9.—SINGLE AND DOUBLE TRACK BRANCH OFF AT CAR HOUSE, TERRE HAUTE ELECTRIC RAILWAY.

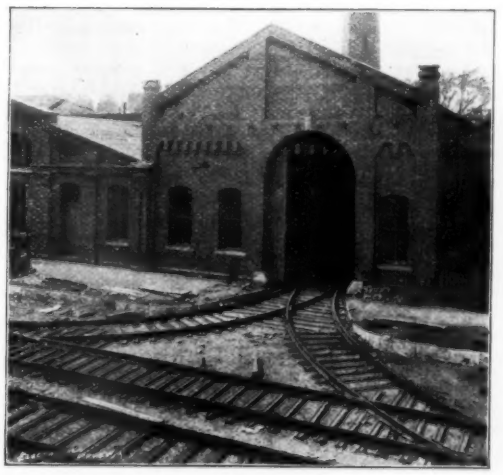

FIG. 8.—DOUBLE CURVE TO POWER HOUSE, TERRE HAUTE ELECTRIC RAILWAY.

ticular, and thus practically demonstrated its great success and merit. Vehicles, carriages and wagons can pass along the rail and turn in or out at will without jar or wrenching. It can be crossed at right angles, or at any angle with equal ease and comfort. A continuous traffic over it has caused no perceptible wear, and the cars glide over it without oscillation as smoothly as when first laid.

Our next experience with T rail construction was in a street paved with asphalt where half a mile was laid in the Fall of 1892 and a mile more in the Spring of 1893.

While asphalt presented some new problems, the T rail, ties, joint plates, bonding and supplementary wire were the same as on Wabash avenue; the foundation was improved by making it of concrete, six inches below the ties. This broken stone concrete was also placed between the ties and up to a point to allow space for four inches of asphalt packed into position.

The asphalt was brought up to and in contact with the rail on the outside for the entire distance of half a mile. On the inside of the rail for the first half mile the vitrified brick used on Wabash avenue, with corner cut off on a sloping angle, was used to give flange space, and between the two ends of the brick asphalt was used in the regular way. On the last mile the merits of the Haydenville blocks having been brought to our "attention," it was decided to use them both inside and outside of the rail, and while it makes a smoother finish to the rail than the brick or asphalt, our experience proves that these blocks do not have the wearing qualities of the brick. This track and asphalt paving are beautiful in finish and of unusual strength and smoothness. It is a genuine pleasure for passengers to ride over this track, for there is no motion perceptible, except the forward motion.

Our next experience with T rail construction was during the year 1893, in several streets paved with brick. The rail was 60 pound Shanghai, and rail plates, bond wire and supplementary wire were the same as in the street laid in asphalt. The foundation was six inches broken stone concrete below these ties, and about five and one-half inches additional concrete between the ties. It also covered slightly the top of the ties. The foundation for this brick track was further improved by pouring a thin wash of sand and cement over the top of the foundation before placing the sand cushion thereon. This gave the foundation, track, ties and concrete a solid union. The brick paving was laid in a manner similar to that on Main street. Instead of angle cut brick for flange space Haydenville blocks were placed on the inside of the rails one and a half inches distance therefrom. The lower part of the space between the Haydenville block and rail was filled with sand concrete, rammed down tight. On top of this an inch of tar was placed. The hollow spaces in the Haydenville block were filled with sand concrete before placing in position, and the space in the center of the track between blocks was laid with vitrified brick in the regular way. This track is perfect in strength, smoothness and durability. A year's experience with the Haydenville blocks on these business streets show that the glazed upper service wears too rapidly, and their use has been entirely discontined.

While this track, just described, was in every way superior, I gave further study to where additional improvements could be made, causing the following changes: First, to use a heavier rail with wider head; second, to substitute metal glass ties or wood; third, to secure greater rigidity and evenness in rail ends; fourth, a firm and permanent hold on the rails without the use of nuts and bolts; fifth, in paving, a better brick and of such shape as would provide better flange room and contact with the web of the rail. These changes brought us to an all-steel T rail track.

Rail—When the Illinois Steel Company brought out the 72 pound Shanghai T rail, which was an improvement both in weight, strength and in the width of the head of the rail over 60 Shanghai T of same make, it was immediately adopted as the company's standard and was used in our latest and best T rail track construction. The Shanghai rails of this company's make are so well known that a description is hardly necessary, but as this paper will be read by some who have not seen sections of them I will give the dimensions of the 72 pound rail. The rail is six inches high, the base is five inches wide, the top or head is two and three-eighths inches in width. The web from where the turns begin is three and one-half inches. The long web permits the rail to rest on the ties and brings the top of rail to proper level for paving with brick, asphalt or granite blocks. In this track the rails are laid broken jointed. The 72 pound rail has a wider head which gives better contact, and wider bearing service for the wheels. The edges of the wheels do not nick or chip out as with the lighter rails with narrower heads.

Experience with the narrow head rails demonstrates that by wear an outer flange is formed on the wheel and that this outer flange is very destructive to the life of special work and the wheel. The wider rail head is also better for gravel or macadamized streets, as it gives no opportunity for the stones lying adjacent to the rail to nick the outer edge of the tread of the wheel.

Foundation—The foundation of a track is to a larger degree than any other part responsible for its wearing qualities, and this fact has not been lost sight of in our work. Good rails, ties and joints cannot alone make a track or properly sustain it so as to keep it level and give good wearing qualities; therefore, under the all-steel track it was determined to place a heavy foundation of the best material. After the necessary excavation the ground was rolled with a heavy 14 ton steam road roller. Then eight inches of broken stone concrete was placed in position and allowed to set. Then the rails, ties and joints were distributed and connected together and when the track is completed it is brought to the required grade or level by putting blocks under the rails at intervals to bring track to proper grade. Then four inches of broken stone concrete is tamped under the ties and under the rails. After the tamping process is completed the inequalities of the surface are filled with concrete and the whole leveled up with concrete over the top of the ties and pounded to a level surface with a wooden rammer and allowed to set.

Ties—The ties are steel and double corrugated and heavily coated with tar while hot, and being made, are two inches high, seven inches wide and seven feet long, for straight line work, and were laid 15 inches between centers. For special work the ties vary in length, as the necessities require, up to 20 feet or more. The metal of the tie is one-half inch thick. These ties were manufactured by the Daniels Steel Tie Company, of Youngstown, O. The rails rest on and are fastened to the ties by clamps with offsets to fit the base of rail. These clamps are secured and adjusted to the top of the tie by special made bolts with oval shoulder and is inserted from bottom of tie with the head below and the nut on top, which permits a powerful box wrench being used to draw the nuts on bolts to a permanent position.

In using these steel ties in connection with the Wheeler rail joint a mechanical difficulty arose, but was overcome in the following way, after some study: The Wheeler joint has a thickness of three inches below the rail base, and in laying track with broken rail joints a straight tie would not answer. At first we thought it would be necessary to use a wooden tie under rail joints, but by devising a special tie we were able to have them all of metal. The special steel tie for use under joints was adjusted to the necessary levels by bending it down in the center three inches by an easy offset. In laying the track these special ties were easily placed in position and gave perfect satisfaction. The clamps and bolts were the same as on straight line work.

Joints—A great deal of attention was given to the subject of securing a good rail joint for this all-steel track, and after examining many devices selected the Wheeler rail joint made at Marion, Ind., as it did away with the bolts and nuts and embodied the best of all mechanical principles—that of the wedge. These joints at that time had not been made for Shanghai rails or for steel ties, but I overcame these difficulties by designing a new joint to be used with these rails and ties and secured in this new pattern more bearing surface on the tie, by having the bottom of the joint made to fit the corrugations of the tie. The joint consists of two parts, one of which is keyed on to the other. The larger or heavier part used on the outside of rail has two lugs that fit in the angle joint holes nearest the ends of rails. After it is placed in position the lighter part is keyed on with a large maul and it holds the rails rigid. Then the tie is placed under joint and is fastened to it in the regular way, with the exception that the clamps have longer offsets, the holes in the ties for the bolts are also wider apart, on account of the width of the base of the joint. The joint has corrugations on each side at right angles to the rail, which gives it great strength. The joint is made of the best malleable iron and weighs 32 pounds complete.

Bond and Supplementary Wire—Iron wire having proved unserviceable and unsatisfactory, the heaviest copper wire was used in connection with steel track. Double bonds of No. 0000 copper wire were used at each rail point, one in the upper and one in the lower part of the web of rail. These bonds were soldered and connected to the No. 00 tinned copper supplementary wire that has been adopted as standard.

Paving—When the foundation is completed and the track set in it, as just described, nothing remains but the paving to complete the track and street for use. The all-steel track was laid on Ninth street, a business street leading from Wabash avenue or Main street to the Union depot, and brick was, therefore, selected for the paving material. This brick pavement was laid as previously described, and needs no further description.

As the use of Haydenville block has been abandoned and the angle, nose-cut brick did not touch the web of the rail, I designed a special shaped brick that has many advantages, combined with the same wearing qualities as the brick on each side of the tracks, as sample pattern of brick which I have with me will give a clear understanding as to its shape.

Drainage—In the earlier laid track in paved streets, rapid and proper drainage of the tracks was not provided for. The paving was crowned to the center of the track and followed the slope of the streets, but when the lowest point in the street was reached no provision was made to carry the water quickly to the sewer. In this new track proper provision is made to get rid of the water from the rain, snow and street sprinkling quickly and effectively. In the center of each track, at the lowest point in the grade of each street, an eight inch sewer pipe was laid to the sewer. Over the top or opening of this pipe in the center of the street is placed a small catch basin surmounted by a special made iron grating. The water flowing down the track and along the side of the rails is thus rapidly removed and a simple and effective drainage secured.

Injury to Track by Vehicles and Heavy Teaming—On our track, which is standard gauge, four feet eight and one-half inches wide, heavily loaded vehicles cannot drive along it and get the benefit of the smooth metallic surface as in the case with girder rails. This condition is a great improvement, and makes a saving in many ways.

First. It saves an immense amount of money in repairing the injury and wrenching to track and rapid wear and tear thereto caused by vehicles, and particularly heavily loaded wagons turning in and out and driving along the track.

Second. It permits a quicker and more frequent car service—which all street railway men know means time and money by giving the cars a clear track.

These are great advantages and will be best appreciated by the managers of the lines in large cities. They can also bear testimony to the large savings effected in the wear and tear.

To further prevent heavy teaming along the flange spaces of our track, and at the same time make the wear and tear on the street paving, which we are required to maintain, a minimum, the following ordinance was passed by our City Council, October 4, 1892:

"An Ordinance Regulating Heavy Hauling Over and Through the Improved Streets of the City of Terre Haute.

"Be it ordained by the Common Council of the city of Terre Haute that it shall be unlawful for any person to drive or cause to be driven or permit his or her servant to drive upon any street or alley paved with wood, stone, brick or asphalt, any wagon or other vehicle having upon it weight which, together with the weight of the wagon or vehicle, shall exceed four thousand pounds (4,000) and less than seven thousand pounds (7,000) unless the tires upon such wagon or vehicle shall be at least three inches in width; nor shall any such wagon or vehicle having upon it a weight which, together with the weight of the wagon or vehicle, shall exceed seven thousand pounds (7,000) be so driven in or upon any such paved street or alley, unless the tires on such wagon or vehicle shall be at least three and one-half inches (3½) in width.

"Section 2. Any person who shall violate any of the provisions of this ordinance shall, upon conviction therefor, be fined, and forfeit and pay not less than five dollars ($5.00) nor more than fifty dollars ($50.00).

"Section 3. This ordinance shall take effect and be in full force and effect on and after December 1, 1892."

In closing this report, gentlemen, I wish to thank you for your attention, and at the same time express the hope that it will prove, as it was intended, a good guide to you in securing that very necessary condition for successful and economical operation—*perfect track.*

Before closing I wish to call your attention to the fact that through the kindness of the Paige Iron Works Company I am enabled to show you in the Exhibition Hall a sample of our special track work, made of 72 pound Shanghai steel rail and laid on the Daniels steel ties, as we lay it. Also samples of Wheeler rail joints, attached and unattached to rails. Also a crude sample of our brick paving. This sample is not as correctly or as smoothly laid as we lay it in Terre Haute, but as I did not reach Atlanta in time to supervise the laying, it would be unreasonable to expect unskilled hands, without guidance, to lay it as our experienced employés do.

TELEPHONE NEWS AND COMMENT.

The Bell Telephone Company, of Buffalo, is now taking subscribers for telephone service in the city of Buffalo, N. Y., furnishing in all cases metallic circuit individual lines at a minimum rate of $50.00 per annum.

The New England Telephone and Telegraph Company has purchased land in Lynn, Mass., to be used as the site of the company's administration building, in connection with burying wires in Lynn, which is now under way.

At a recent meeting of the Dunkirk, N. Y., Common Council City Clerk Maloney was authorized to correspond with a competing telephone company which has expressed a wish to locate in Dunkirk as one of a number of the cities of the States forming a system.

The Brooklyn, N. Y., Electrical Subway Commission has denied a permit to the New York and Eastern Telephone Company to string wires, as the company is not incorporated under the Telegraph Act of New Jersey. It is said that the company will mandamus the board. This company is having a hard road to hoe.

The Bell Telephone Company, of Missouri, has installed a very complete interior telephone system in the new and elegant St. Nicholas Hotel, St. Louis. The telephones in the guests' rooms have the same numbers as the rooms. A guest can talk with the office or with any of 20 other stations located in the principal public rooms of the hotel.

The new Haymarket exchange of the New England Telephone & Telegraph Company, in Boston, which it was expected would be in operation by October 1, will not be ready until the first of the year. Its first effect will be to lessen the work of each operator in the "Boston" exchange, and to that extent improve the general telephone service.

John P. Persch got an injunction restraining J. W. Allison from assigning or transfering two notes of $10,000 each, given by the plaintiff to Allison, and the New York Guarantee and Indemnity Company from collecting the notes. A motion was made in the Supreme Court in Brooklyn, N. Y., to continue the injunction. Mr. H. Hirsh, for the motion, said that the papers were given for the transfer by Allison of his license to introduce the Strowger automatic telephone system into Pennsylvania. The statements as to the absolute secrecy with which communication could be made by the new system and as to the patents held by the company were false, and the plaintiff wanted his notes returned.

As predicted in the ELECTRICAL REVIEW last week, a special meeting of the American Bell Telephone Company's stockholders to accept or reject the act of the last legislature will be held in the company's building, Boston, on November 15, at 11 A. M. Transfer books will not be closed for the meeting, and stockholders whose names appear on the books on the morning of the meeting will have the right to vote. The new stock will be offered to shareholders at such price as may be determined by the Commissioner of Corporations, to be fixed under the provisions of the law. This price will, it is expected, be the average price of the stock on the day of the meeting. Nothing has been done towards underwriting the stock, and it is not probable that anything will be, as the law provides that all stock not taken by stockholders shall be sold by auction.

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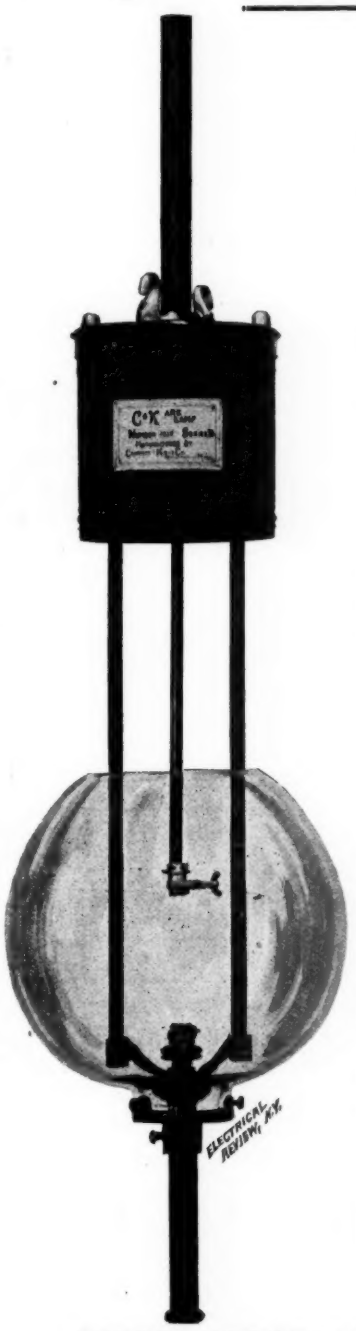

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KINDRED INTERESTS

The Eddy Electric Manufacturing Company, of Windsor, Conn., is running its plant overtime to catch up with the large number of orders in hand.

F. R. Chinnock, contractor for electric light and power plants, Central building, New York, is installing 17 miles of first-class track construction in Hoboken, N. J., and vicinity.

Randolph & Clowes, of Waterbury, Conn., have placed the contract for the extension to their muffle room with the Berlin Iron Bridge Company, of East Berlin, Conn.

The Beacon Vacuum Pump and Electrical Company, Irvington street, Boston, Mass., is sending out a folder giving the prices of the improved "New Beacon" incandescent lamps and illustrating 10 styles of bases with which these lamps from 45 to 125 volts are furnished.

Now that the United Electric Improvement Company have moved into their spacious new factories at Nineteenth street and Allegheny avenue, Philadelphia, Pa., we shall expect to hear great things of them. Their facilities in their new home for turning out good work are excellent, as their factories are equipped with everything modern.

As long as electrical supplies are in demand in this country, just so long shall we expect the Patrick & Carter Company, of Philadelphia, to supply their share of them. One of the pleasant things which has so large a share in the making of such an extended good-will as is enjoyed by this house is that everybody knows that only reliable electrical supplies are to be had at No. 125 South Second street, Philadelphia, Pa.

Among the busy workers in the street railway department of electrical development there is one concern that is pre-eminently busy and largely successful. This concern is the Hubley Manufacturing Company, of Lancaster, Pa. A representative of the REVIEW recently visited their works and found them as usual brimful of activity. This firm's specialties are meeting with widespread popularity, and their output is taxed to the utmost limit to keep up with the demand for these goods. Their construction department is in a very healthy condition, as is instanced by large contracts which have been secured for work on newly projected trolley roads in Lancaster and thereabouts.

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Receiver's Sale.

United States Circuit Court for the Southern District of New York. Charles F. Oxley, Complainant, against The Archer & Pancoast Manufacturing Company, defendant. Carlos French, Complainant, against The Same. Consolidated Causes in Equity.

The undersigned, Receivers of all the property, assets and effects of the said corporation, the Archer & Pancoast Manufacturing Company, will sell at public auction, pursuant to a decree and order of this court made and entered herein and bearing date the 19th day of October, 1894, at the Real Estate Exchange, No. 111 Broadway, in the City of New York, by George R. Read, auctioneer, on Thursday, the 15th day of November, 1894, at twelve o'clock noon of that day, in one lot or parcel, and not divided or separated, all the property, both real and personal, and all the rights, choses in action and effects of said corporation, said property being described as follows:

All that certain piece or parcel of land with the buildings erected thereon, situate, lying and being in the Twentieth Ward of the City of Brooklyn, County of Kings, and State of New York, and bounded and described as follows, to wit: Beginning at the point formed by the intersection of the southerly line of Flushing avenue with the easterly side of Carlton avenue, and running thence southerly along the easterly side of Carlton avenue one hundred and fifty feet and three inches (150 ft. 3 in.); thence easterly and at right angles with Carlton avenue forty-five feet and four inches (45 ft. 4 in.); thence southwardly along the land formerly of Sarah Ryerson and nearly parallel with Carlton avenue one hundred feet (100 ft.) more or less to a line drawn at right angles with Carlton avenue through a point in the easterly line thereof, distant two hundred and fifty feet and three inches (250 ft. 3 in.); southwardly from the southeasterly corner of Flushing and Carlton avenues, and to land now or late of Elizabeth Atthisar; thence eastwardly along said last mentioned land and line one hundred and twelve feet and three and one-half inches (112 ft. 3½ in.) to land now or late of Henry L. Clark; thence northerly along said last mentioned land and parallel, or nearly so, with Carleton avenue two hundred and seventeen feet and two inches (217 ft. 2 in.) to a point in the southerly line of Flushing avenue, distant forty feet and ten inches (40 ft. 10 in.), more or less, westwardly from the southwestwardly corner of Flushing avenue and Adelphi street; and thence westwardly along the southerly line of Flushing avenue one hundred and sixty-three feet and five inches (163 ft. 5 in.) to the point or place of beginning.

And also all that certain lot, piece or parcel of land situate, lying and being in the said City of Brooklyn, bounded and described as follows: Beginning at a point on the southerly side of Flushing avenue twenty feet and five inches (20 ft. 5 in.) westerly from Adelphi street; running thence westerly along Flushing avenue about twenty feet and five inches (20 ft. 5 in.) to land formerly of Phebe Kissam; thence southerly along Kissam's land about eighty-six feet and two inches (86 ft. 2 in.) to land heretofore conveyed by Henry L. Clarke and wife to Edward Marrin; thence easterly along said Marrin's land at right angles to Adelphi street about twenty feet and four inches (20 ft. 4 in.) to land formerly of James Traynor; thence northerly along said Traynor's land and parallel with Adelphi street about eighty-two feet and ten inches (82 ft. 10 in.) to the place of beginning.

And also all those two certain lots of land situate, lying and being in said City of Brooklyn, and bounded and described as follows: Beginning on the westerly side of Adelphi street at the northeasterly corner of a piece of land heretofore conveyed by Henry L. Clarke and wife to William E. Winant, which corner is two hundred and twenty feet and eight inches (220 ft. 8 in.) south of Flushing avenue; running thence northerly along Adelphi street thirty-nine feet and six inches (39 ft. 6 in.) to land formerly of A. McNeely, as conveyed to him by said Henry L. Clarke by deed recorded in Lib. 822 of Cons., page 464; thence westerly at right angles to Adelphi street and along said McNeely's land about forty-two feet five inches (42 ft. 5 in.) to land formerly of Phebe R. Kissam; thence southerly along said Kissam's land and nearly parallel with Adelphi street about thirty-nine feet and six inches (39 ft. 6 in.) to said Winant's land at a point continuous of a line drawn at right angles to Adelphi street from the place of beginning; thence easterly along such continuous line at right angles to Adelphi street about forty-two feet and six inches (42 ft. 6 in.) to Adelphi street at the place of beginning.

Together with all the right, title and interest of the said corporation, if any, in and to Flushing and Carlton avenues and Adelphi street, lying opposite to said premises, to the center of said avenues and street respectively.

Said four lots above described being covered by a mortgage for $55,000, made by Charles F. Oxley and others to John W. Hunter and another, as Trustees, and recorded in the Register's Office of Kings County, November 12th, 1887, in Liber 1950 of Mortgages, page 327, with interest at five per centum per annum from the 2d day of June, 1894.

And also all and singular the machinery, utensils, tools, implements, boilers, engines, stock, manufacturing materials, models, patterns, merchandise, fixtures, book accounts, claims, things in action, good will, trade mark, name or names, patents, letters patent, invention and patent rights and interest therein, and all rights, property, assets and effects of every kind and nature whatsoever of the said corporation, the Archer and Pancoast Manufacturing Company.

N. B.—No bid therefor for a less sum than $600,000 will be received, and fifty thousand dollars must be paid in cash by the purchaser at time of sale, and the balance of the purchase money within thirty days thereafter.

Dated New York, October 22d, 1894.
ARCHER V. PANCOAST,
ALANSON T. ENOS,
Receivers.

DAVIES, STONE & AUERBACH,
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